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ABSTRACTS OF TUBERCULOSIS

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Tuberculosis Problem.—The two main problems of tuberculosis are early diagnosis and treatment and adequate after-care. The number of early cases admitted differs among various sanatoria, but the usual experience is from 17 to 25 per cent and rarely over 40 per cent in the most favorable circumstances. Of 2,760 patients treated between 1903 and 1919, 40 per cent were living 13 to 19 years after discharge. Of the early cases in this group, 64 per cent were alive at the end of 19 years. From a series of cases it was concluded that there was a delayed or mistaken diagnosis in 25 per cent. There was an unreasonable delay in consulting a doctor in 20 per cent when symptoms were present, and no unreasonable delay in 74 per cent when the onset was sudden or asymptomatic. Six per cent were discovered on routine examination. From a group of 100 cases from the more educated and wealthier classes, it was concluded that the doctor was unduly slow in making a diagnosis in 36 of them, and the patient delayed unduly consulting a doctor in 20. Although great advance has been made in the last 20 years in the early diagnosis of tuberculosis no very great decrease has occurred in the time between appearance of symptoms and the application of treatment. Twenty years ago this time averaged 18 months. The only feasible remedy is to educate the public as to symptoms and dangers of tuberculosis and to search for cases. The State provides quite adequate treatment for the notified patient, but does not guarantee the provision of permanent security with treatment nor adequately provide for maintenance of the family. There are two classes of patients to be considered: (1) the advanced incurable case and (2) the curable case. Some of the former leave the sanatorium and go home, while others are provided for in homes for the incurable sick or infectious-disease hospitals. The public-assistance institutions might also be made more suitable for the advanced case. For the curable case, adequate after-care is essential and is represented in its best form in the settlement where hospital, sanatorium and settlement are located at one centre. Accommodations in a settlement cannot yet be offered all patients and less complete measures are being tried.—*Our Difficulties in the Conflict against Tuberculosis, F. W. Burton-Fanning, J. State Med., September, 1934, xlii, 497.*—(*L. F. B.*)

Massachusetts Tuberculosis League.—In May, 1933, at the request of Mayor Russell of Cambridge, the League undertook to make a study of tuberculosis and facilities for handling it in that city. Through Dr. Kendall Emerson of the National Tuberculosis Association, the services of Dr. Carl E. Buck, Field Secretary, American Public

Health Association, were retained. His major recommendation was that Cambridge should arrange for admission to the Middlesex Sanatorium District and its Municipal Sanatorium be used only for chronic cases. The League also made a study and report for the Southern Middlesex Health Association, whose President, Dr. Carl MacCorison, wished to find out whether continuation of its large Summer Health Camp at Sharon was justified. The records of 564 children who could be reached out of 1,000 cared for between 1925 and 1932, were studied, X-rays were taken and physical examinations were given at the North Reading and Middlesex County Sanatoria. The preliminary report was submitted to Dr. Carl Doering of the Harvard School of Public Health who believed no conclusions justified from the standpoint of a statistician. In order to obtain a comparable group without summer health-camp experiences, Dr. Alton S. Pope and Raymond E. Johnson, of the State Division of Tuberculosis, selected the records of a group of children from the Chadwick Clinic files. The major conclusion reached was that the camp is a worth-while project, with measurable immediate benefits to the children, and that the friendly family contacts established offer an unusual opportunity for follow-up and health education. Six county governments have already made the summer health camp a part of their permanent program—Barnstable, Plymouth, Bristol, Norfolk, Essex and Hampshire, while Worcester and Middlesex are likely to do so. The League has gone on record as favoring the bill to authorize the County Commissioners of Middlesex County to add 135 beds to the Middlesex County Sanatorium capacity. A number of local associations have been reorganized or their work extended with the assistance of the League—Haverhill, Nantucket, Barnstable County, Middlesex County, Holyoke, and Cambridge, for example.—*Annual Report of Executive Secretary of Massachusetts Tuberculosis League, F. Kiernan, New England J. M., August 16, 1934, ccxi, 314.*—(*A. P.*)

Tuberculosis Control in Massachusetts.—The mortality from pulmonary tuberculosis has steadily fallen during seventy-six years, from 395 per 100,000 living to 53.9 in 1932 and 47.7 in 1933. This is largely to be ascribed to improved living standards and diminishing community infection, and it seems fair to assume that the League's activities have played an important part in the latter. At present Massachusetts has 4,118 beds in state, county and other sanatoria, or 2 per annual death. Still facilities are not adequate in all communities, there being urgent need for more beds in Middlesex County and desirability for a Hampden County Sanatorium. Collapse therapy is desirable for selected cases. The present percentage of patients in Massachusetts institutions receiving this, about 30 per cent, compares favorably with that in other institutions. Pope reports that during 1933 pneumothorax was done on 664 (23.2 per cent) of 2,779 patients, phrenic-nerve operations on 216 and thoracoplasty on 84. Throughout the institutions in this state the proportion of cases treated by collapse therapy varies from 0 to 61.6 per cent. The most valuable activities of the League and affiliated organizations are (1) promoting an enlightened public opinion favorable to the adoption of sound measures of prevention and control, and (2) assistance and coöperation in the work of official agencies. It can aid considerably in securing a larger proportion of parental consents for the investigation of school-children and in emphasizing the desirability of examination of family contacts and the breaking of such contacts. At present 14 organizations serve 12 of 14 counties and one municipal association all but a small part of Suffolk County. The other 13 are essentially county organizations, and the question may be raised whether certain consolidations might be in the interest of economy and efficiency. Administrative expenses, including salaries, would thereby be diminished, although the larger the unit the less intimate the contact with local problems. *Summer health camps:* Nineteen such camps are maintained, either wholly or in part, by the affiliated organizations, six of which are on the grounds of county sanatoria. In the interests of economy and efficiency all might well be affiliated with the sanatoria. The National Tuberculosis Association has questioned the value of the camps in view of the expense and effort entailed. They do undoubtedly offer some sort of health education for about 2,000 children annually and the subsequent histories of camp children should be investigated to determine their advantage, if any, in preventing tuberculosis, over other community resources. Admission of other than tuberculous and contact children, except for special reasons, seems an unwise expenditure of funds contributed for the prevention and control of tuberculosis, and enrollment is now largely restricted to children selected on the basis of standards suggested by the League. Mild types of childhood tuberculosis, suspicious cases, contacts reacting to tuberculin and reactors suffering from malnutrition, are those who need more intensive oversight. Pope has shown that the incidence of both hilum and pulmonary tubercu-

losis is much higher among contact tuberculin-reactors than among the non-contact reactors. Children with X-ray evidence of hilum tuberculosis deserve special consideration. Pope finds that reactors followed as suspects but without X-ray evidence of lesions, develop pulmonary tuberculosis at the rate of 0.15 per cent per year. Those who also show X-ray evidence of lesions develop the disease at twice that rate, 0.3 per cent per year. Also, as female children develop two and one-half times as much pulmonary tuberculosis as males, girls should be given preference in the camps. Adult pulmonary types or very active and extensive childhood types of involvement should exclude the individual from the summer camps and, in order to benefit the largest number, old campers should be rejected except for special reasons. A period of less than two months in the camp is not desirable. A special committee of the League is about to consider more fully the entire problem of the organization of camps.—*The Prevention and Control of Tuberculosis in the Commonwealth of Massachusetts with Special Reference to the Activities of the Massachusetts Tuberculosis League, F. T. Lord, New England J. M., August 16, 1934, ccxi, 312.*—(*A. P.*)

Tuberculosis Institutions in Scotland.—In a little over sixty years the tuberculosis mortality in Scotland has been reduced nearly 80 per cent and between 1913 and 1932 over 50 per cent. Credit is given improved housing, better living and working conditions, and government supervision of factories and workshops, but better institutional provision is considered most important. Whereas in 1913 Scotland had one-quarter bed per annual death, in 1932 it had 1.2 beds per death. In beds per 100,000 population it has shown an increase of from 44 in 1913 to 104 in 1932. A study of other countries also brings out the remarkable fact that adequate provision for institutional treatment is almost invariably associated with a low tuberculosis mortality and *vice versa*. Denmark, with the second lowest tuberculosis mortality of 20 countries cited and the lowest in Europe, has the most beds per 100,000 population, 107, and also the most beds per annual death from tuberculosis—1.50. Portugal, with the highest tuberculosis mortality on the list, has only 35 beds per 100,000 population and 0.18 per annual death. Scotland is seventh in tuberculosis mortality (84 per 100,000), slightly ahead of England and Wales; and second in tuberculosis beds per 100,000 population, and also in beds per annual tuberculosis death, 1.23, in both these respects leading England and Wales by a large margin. Rumania, which has the least provision for special care of tuberculosis, has a mortality about twice that of Scotland. *Requisites of tuberculosis institutions:* The ideal sanatorium should care for tuberculosis in all stages, with a hospital for absolute rest cases, pavilions for graduated exercise, and a labor colony for convalescents able to work. The personnel should include: *1:* A full-time laboratory technician capable of real chemical and serological investigation, in addition to routine examinations and tests. *2:* A physician with special knowledge of cardiology. *3:* A radiologist, able not only to take chest films, but to carry out lipiodol examination, pyelography and do gastrointestinal work. *4:* A laryngologist also acquainted with bronchoscopy and able to do the simpler operative procedures on the upper respiratory tract. *5:* A surgeon specially experienced in chest surgery. *6:* A chief physician to coördinate the work of the medical staff and determine therapeutic procedure after discussion and consultation with others interested. *7:* A skilled nursing staff with special tuberculosis experience. Such requirements cannot be met unless the institution be large enough to provide adequate funds for salaries. In fact, little more than half the 5,060 approved tuberculosis beds in Scotland are institutions with even a single resident physician. Some are attached to fever hospitals, others isolated and scattered here and there, receiving only an occasional visit from a physician, lacking the elementary facilities for diagnosis and for active treatment, even artificial pneumothorax. These features discourage and dishearten patients sent to such places, so that many will only go as a last resort, or, if they do go, they refuse to stay. As a result, many such beds remain empty and are wasted. This is not to ignore the excellent work done by some small institutions, with the personal kindliness, consideration and skill shown by their personnel, but, in general, conditions and results are unsatisfactory. It is a mistake to make every small community responsible for the treatment of its consumptives. Individual small communities cannot establish and maintain efficient specialized institutions. For Scotland 10 or 12 institutions situated at convenient distances, each of 400 to 500 beds, could be staffed and equipped for real team-work in diagnosis and treatment, fixed charges being made to the communities served. At present there exist the nuclei for such institutions, with capacities of 100 to 200 beds which could readily be extended, with eventual saving of money; for to run an institution of 100 to 150 beds efficiently and

economically is more difficult than one of twice that capacity. With a larger and more specialized staff a greater variety of work could be attempted and better results expected. The Bridge of Weir Sanatorium, serving the Glasgow district, is given as an example.—*The Institutional Treatment of Tuberculosis: a Plea for Large Self Contained Medical and Surgical District Units, J. Crocket, Tubercle, September, 1934, xv, 537.*—*(A. P.)*

Tuberculosis Institutions.—Twenty years ago tuberculosis colonies were called "Farm Colonies," but to-day they are "Industrial Colonies." The greatest advance in treatment is collapse therapy. Artificial-pneumothorax treatment was introduced in 1910 and about 5 per cent of patients were considered suitable for treatment. The percentage now is about 50. Results tabulated in May, 1934, showed 93 per cent of the Ministry's class II cases, with efficient pneumothorax and a phrenic-nerve operation, to be alive 3 to 9 years after the pneumothorax was started. Sixty-five per cent who had pneumothorax alone were alive 3 to 9 years later. Twenty-eight per cent in whom pneumothorax was impossible were alive after a similar period. In class III patients the figures were, respectively, 81 per cent, 31 per cent, and 8 per cent. Other methods of collapsing the lung have been invented and are being developed. Formerly there were sanatoria for early and curable cases and hospitals for advanced cases. The hospitals were often looked upon as homes for the dying. To-day institutions should admit all types of cases because collapse therapy offers promising results and for psychological reasons. Hopeless cases might be cared for better near their homes by the public-assistance institutions. Institutions should deal also with nontuberculous conditions such as bronchiectasis and new growths. To obtain expert physicians large institutions may be necessary. For surgical treatment, however, smaller institutions are best, provided they are served by a specialist expert surgeon. As yet only about a third of the residential institutions in this country meet a desirable standard of treatment and efficiency.—*The Arrangement of Institutions in Public Tuberculosis Schemes, S. V. Pearson, Jour. State Med., September, 1934, xlii, 513.*—*(L. F. B.)*

Nontuberculous Conditions in Tuberculosis Dispensary.—The period of this study is four and a half years, coinciding with the installation of an X-ray plant. Cardiac lesions, silicoanthracosis and bronchiectasis are omitted. *Syphilis:* Its manifestations may be overlooked or may simulate those of tuberculosis. Cervical lymphadenitis and laryngitis occur. Eight cases in children are cited, of whom 4 had enlarged cervical lymph nodes and were tuberculin-negative, but with positive blood Wassermann reactions. Two girls of 13 showed a laryngitis of six months' duration with no associated pulmonary lesions. One girl of 14 had free fluid in the abdomen, enlarged liver and spleen, and positive Wassermann reaction. No pulmonary syphilis is included. *Purulent pleural exudate:* There were 9 such cases, usually with a long history and appearance of chronic severe illness. Some were tuberculin-negative. *Pulmonary cysts:* There were 3 cases of pulmonary hydatid cyst. The X-ray films showed dense well-defined shadows, one suggesting a localized effusion. Two gave a positive Casoni intracutaneous test. *Intrathoracic neoplasms:* This group included 50 cases, 45 of them men, mostly over 40. Bronchial carcinoma was most frequent, but there were some cases of lymphosarcoma of the pleura and mediastinal lymph nodes in the younger group. The course is more rapid than that of tuberculosis and usually fatal within six to twelve months. Ten gave a history of pleurisy and six had an effusion. Physical signs are not characteristic, but a localized pneumothorax or pleural effusion in an elderly man is suspicious. The X-ray films in bronchial carcinoma show an airless or deflated lung most commonly, and in mediastinal growths a dense opaque shadow. Eight cases were confirmed postmortem. These cases were referred from an area with a population of 240,000 (Swansea District, Wales). While a negative diagnosis as to tuberculosis is of some value, a positive alternative diagnosis is even more helpful to the patient and the medical profession.—*Cases of Clinical Interest in a Tuberculosis Dispensary, H. M. Williams, Tubercle, October, 1934, xvi, 17.*—*(A. P.)*

Tuberculosis and Medical Practice.—Since 1910 the Massachusetts death-rate from this disease has dropped from 158 to 53 per 100,000. Even now, however, it causes 4.6 per cent of all deaths in the state. In 1932 the male rate was 62 and the female rate 46 per 100,000. Assuming 10 cases for each death, we can estimate that there are now 23,000 individuals with some form of the disease, of whom about 4,000 are in sanatoria or on waiting lists for them. It is also estimated that there are 10,000 undiagnosed cases or two for each registered physician. Tuberculosis is still the leading cause of death between 15 and 40; yet, contrary to general assumption, the mortality figures

continue to increase after that age. During the first ten years of life the male rate is higher, during the next ten the female, and after thirty again the male. The high peak in infancy is largely due to meningeal tuberculosis. When the city of Detroit provided enough beds to care for all tuberculosis patients promptly on application, the deaths from tuberculous meningitis immediately dropped from an average of 122 to 72 per year. In adolescence Pope has shown that, although the rate of infection for boys and girls is the same from 5 to 18, pulmonary tuberculosis is more frequent among infected girls, being 1.5 times as high from 10 to 14 and 3 times as high from 15 to 18. He estimated, from the morbidity found among 100,000 school children in Massachusetts, that there are at least 1,800 cases of pulmonary tuberculosis in the state among children between 5 and 18, and Zacks has shown that an average of three years elapses between the X-ray diagnoses and the appearance of clinical symptoms, while another two or three years elapse before death. *Tuberculosis as found in samples of the population:* Among 250,000 elementary school children examined in the Massachusetts school clinics, one child in 75 was found to have childhood-type tuberculosis and one in 1,200 pulmonary tuberculosis. Among 35,368 high-school students pulmonary tuberculosis occurred in one in 400, and among 250 school teachers X-rayed by the Michigan Tuberculosis Association, 2 per cent. A year later a thousand more were X-rayed, adding another 1 per cent. This seemed to indicate the need of annual roentgenographs of school teachers in order to protect the children under their care. About 1930 Chadwick studied the incidence of pulmonary tuberculosis in 400 women admitted to the obstetrical service of the Herman Kiefer Hospital, Detroit, roentgenograms being taken of 400 consecutive patients, among whom 4 per cent were found to have pulmonary tuberculosis. Among 254 student nurses in 7 general hospitals, 1.1 per cent were found to have pulmonary tuberculosis, and 34.7 per cent reacted to tuberculin. The Massachusetts Commission on Industrial Diseases in 1933 found 3.5 per cent of foundry-men and 9.1 per cent of granite-workers studied to have pulmonary tuberculosis. It can be concluded that a physician comes in contact with approximately two cases for every 100 adult patients he sees. Diagnosis should be made promptly and the two most essential procedures are a roentgenogram of the chest and a sputum examination, repeated if necessary. These, plus a good history, can usually establish the presence and activity of the disease, auscultation being a supplementary or confirmatory procedure. Delay in diagnosis is more costly than roentgenography. Portable units are readily obtained for bedside and office use. Bronchiectasis can be differentiated by the use of lipiodol, and bronchoscopy is of much value in locating other nontuberculous conditions. *Treatment:* This has been revolutionized within five years, with the addition to bed-rest of pneumothorax, phrenic-nerve surgery and thoracoplasty. Collapse therapy has a wide field of application, only the two extremes of very minimal and very extremely advanced cases being unsuitable. Localized rest and cavity closure are the two desiderata aimed at by these measures. Chadwick estimates that 75 per cent of patients when first seen are suitable for some form of collapse therapy. Accessibility to an X-ray, however, is essential for pneumothorax therapy. In some cases with small cavities phrenic-nerve surgery may be preferred to pneumothorax. Pneumothorax treatment, once begun, should not be discontinued prematurely, nor attempted at all by those unfamiliar with the procedure. Likewise, thoracic surgery should be restricted to those with special training and knowledge. The sanatorium is the best place for decision on and application of these special measures.—*Tuberculosis as it Affects the Physician's Practice, H. D. Chadwick, New England J. M., August 2, 1934, ccxi, 204.*—(*A. P.*)

Case-Finding.—Roentgenograms are the most reliable means of detecting pulmonary tuberculosis, but are too expensive to be used in routine examinations of patients. Physical examination should always be done but is of little value, since negative findings do not necessarily rule out even advanced tuberculosis. The history-taking method is of great assistance but is inadequate. The tuberculin reaction is of great value only in children. Paper films cost only slightly less than the celluloid, and are not clear enough to be used other than for screening out cases before celluloid roentgenograms. Fluoroscopy is the method of choice. It has special diagnostic value in determining the mobility of the diaphragm and range of expansion of the lungs, and the chest can be observed from many angles. In the medical division of the Metropolitan Life Insurance Company chest roentgen-ray and fluoroscopic examinations were made of 1,035 employees who had not been under observation and were supposedly healthy. Only 2 cases of tuberculosis of clinical significance were missed on the fluoroscopic examination and these were very minimal cases. Analysis of the results of this method for five years reveals that it

was possible (1) to detect each year, among applicants for employment, one per cent of tuberculosis which would otherwise have escaped discovery; (2) to reduce the incidence of new cases of tuberculosis among employees from 92 per 10,000 in 1928 to 43 per 10,000 in 1932; and (3) to detect tuberculosis in early stages. Sanatorium admissions in 1928 were 47 per cent minimal; in 1932, 76 per cent minimal. Fluoroscopy, by reason of its accuracy, economy, rapidity and simplicity of technique, is the most efficient basis of selection for complete roentgenoscopic examination.—*Tuberculosis Case-Finding. Five Years' Experience with Fluoroscopy, Ada C. Reid, Am. J. Med. Sc., August, 1934, clxxxviii, 178.*—(*E. M. J.*)

Factors Influencing Mortality in Pulmonary Tuberculosis.—A five-year follow-up study of 506 sanatorium-treated cases was made in an effort to determine the factors influencing mortality rates. Twenty-one per cent of the entire group, largely made up of the most favorable patients, could not be traced. Fifteen per cent of the traced group were minimal cases, of which 78 per cent had a negative sputum on admission; and, of these, 81 per cent are well, 9 per cent ill, and 10 per cent dead. Of the minimal cases with positive sputum, 38 per cent are well, 23 per cent ill, and 39 per cent dead. The average length of stay of the minimal cases was 217 days. About a third of the 506 cases were moderately advanced, of which 53 per cent had negative sputum and, of these, 45 per cent are well, 19 per cent ill, and 36 per cent dead. Of the moderately advanced cases with positive sputum 44 per cent are well, 10 per cent are ill, and 46 per cent dead. Of the advanced cases 41 per cent had negative sputum, and, of these, 14 per cent are well, 9 per cent ill, and 77 per cent dead, and, of those with positive sputum, 13 per cent are well 7 per cent ill, and 80 per cent dead. Patients in the two advanced groups averaged 320 days in the sanatorium. The importance of early diagnosis and prompt initiation of sanatorium treatment is apparent, since the mortality at the end of five years was 17 per cent in the minimal and 79 per cent in the advanced cases. The mortality in the moderately advanced and advanced cases varied inversely with the duration of sanatorium treatment. Cases in the minimal and moderately advanced stages with negative sputum showed a distinctly lower mortality rate than did cases in the same stage with tubercle bacilli in the sputum. In the advanced group there was no significant difference in mortality between sputum negative and sputum positive cases.—*Certain Factors Influencing the Mortality of Sanatorium Treated Cases of Pulmonary Tuberculosis, A. D. Langmuir, S. L. Williams & A. S. Pope, New England J. M., July 5, 1934, ccxi, 26.*—(*R. C. S.*).

Sanatorium Facilities and Tuberculosis Mortality in Canada Provinces.—Tuberculosis mortality was decreasing before the sanatorium era, and Pearl doubts that sanatorium treatment has affected it. It was therefore advisable to make a comparative study of tuberculosis mortality on populations similar except in respect of the extent of facilities for sanatorium treatment. Such similar population groups are available, with specified exceptions, among the various Canadian provinces. For example, a comparative study was made of Alberta and Saskatchewan, similar except in provision for tuberculosis beds, of which Saskatchewan has 50 per cent more per tuberculosis deaths. This province was also found to have lower tuberculosis mortality rates in every age-group except in males of 50 to 59 and females of 30 to 39. In the same way Ontario and Quebec were compared, the latter having only about one-fourth the sanatorium beds per annual tuberculosis death that Ontario has. Correspondingly, Ontario has in every group a much lower tuberculosis mortality than Quebec which shows the highest for any of the provinces. In addition, the degree of improvement since 1901, when sanatorium facilities scarcely existed, was less among males than for any other province except British Columbia; and among females only the Maritime Provinces showed less improvement. Saskatchewan, with a very high 1901 rate, led in both instances in diminution of mortality. New Brunswick and Nova Scotia, with similar climatic conditions and population, were also compared. New Brunswick, with a larger proportion of sanatorium beds, had the lower tuberculosis mortality. The high infant and childhood tuberculosis mortality in British Columbia is ascribed to special differences in population as compared to the other provinces, comprising 60 per cent Asiatics and 20 per cent native Indians, both of which races are peculiarly susceptible to tuberculosis, especially in early life. Its unduly high rate for males between 20 and 50 is explained by the attraction of many war pensioners because of its mild climate. Contributing to Quebec's very high female tuberculosis mortality is the prevalence of large families, meaning frequent pregnancies, in which respect it has changed less than the other provinces. From the above studies it is suggested that the main function of sanatoria is one of quarantine, or prevention of spread of in-

fection.—*The Relation between Sanatorium Facilities and the Total Death Rate from Tuberculosis in Canada, M. T. Macklin, Tubercle, October 1934, xvi, 22.*—(*A. P.*)

Abortion in Tuberculosis.—Along with fecundation and the cessation of ovulation there comes a widespread readjustment of the endocrine system. The physiological balance is also disturbed in tuberculosis, the degree depending on the severity of the lesion and the constitutional characteristics of the patient. Therefore, pregnancy and tuberculosis, when present simultaneously, will require greater adjustment than either condition alone. It seems well established that, aside from the disturbed nutrition and temporary lowering of resistance, which is caused by the nausea and vomiting of the early months of pregnancy, tuberculosis is not infrequently favorably influenced during the later months, and again unfavorably influenced after birth of the child. The question as to the advisability of abortion is one that is influenced by many variables, such as the characteristics of the lesion and the specific resistance of the patient, and probably each case should be decided on its merits. In private practice among women who have been able to give themselves good care, terminating the pregnancy should be considered if the disease is active and the condition has been discovered prior to the third month. If proper care can be arranged and the patient apparently has good resistance, and provided the lesion is not extensive and is of the milder type, she may usually carry the child with safety. On the other hand, if the patient does not show evidence of good resistance and the tuberculous lesion is not of a mild type, and if the conditions for the mother during gestation and after confinement are not favorable, her safety will be best guarded by terminating the pregnancy at once. The author's experience in terminating pregnancy has been far less favorable in those cases aborted after the third month. The shock is usually considerable, and the operation is quite often followed by increased activity in the lung. It seems better to give such a patient the best possible treatment, pneumothorax being used if necessary, and to allow her to go on to term under the care of a skilful obstetrician. In primiparae, Caesarean section may now and then be the best way out. Under no circumstances should a mother with active tuberculosis nurse her child. Patients, who have been able to overcome a limited pulmonary tuberculosis only with great difficulty, are very apt to break down again under the strain of pregnancy, particularly if it occurs too soon following illness. One must also remember that the prognosis of a patient is reduced by every complication that throws an extra burden on the patient.—*Indications for Therapeutic Abortion in Tuberculosis, F. M. Pottinger, Jour. Am. Med. Ass., December 22, 1934, ciii, 1907.*—(*G. L. L.*)

Transmission of Tuberculosis through Placenta and Amniotic Fluid.—Amniotic fluid from 24 women with pulmonary tuberculosis was injected into guinea pigs, 2 animals for each case. One animal was killed at the end of two months, the other after four months. Amniotic fluid produced tuberculosis in 3 guinea pigs. The placentas from 21 women were used for further studies. Guinea pigs were inoculated and cultures for tubercle bacilli were made. The cultures remained negative. Three guinea pigs died the first day. One guinea pig developed tuberculosis. Of the 3 women with infected amniotic fluid two are living and in good health. The third died twenty-three days after confinement. The woman with the infected placenta is in good health. The children appear to be healthy and developing well.—*Transmission transplacentaire de la tuberculose, N. Palicios-Costa & M. Falsia, Compt. Rend. Soc. Biol., October 27, 1934, cxvii, 459.*—(*M. T. W.*)

Tubercle Bacilli in Butter.—The technique of the biological test for the presence of tubercle bacilli in butter is as follows: From 60 to 100 gm. butter are taken and melted at a temperature of 40°C. in 150 cc. distilled water in a beaker. This is then pumped twice through a "cream making" machine into a centrifuge-tube. It is next centrifugated at 3,000 *r.p.m.* for half an hour. The cream is then removed with the aid of a stout wire, the supernatant fluid poured off, the deposit suspended in 5.0 cc. of salt solution, and inoculated subcutaneously in equal amounts into the anterointernal aspects of the right thigh of each of 2 guinea pigs, the inguinal lymph nodes having been previously squeezed after the method of Bloch. The animals are killed after one month, and examined with great care for the presence of tuberculosis arising from the site of inoculation. By this method 40 samples of Danish (15) and New Zealand and Australian (25) butter have been examined and the organism was found in one of the Danish samples. This is rather surprising, since these butters are usually believed to be made from cream which has been efficiently pasteurized. It is recognized that the butter may have been infected after production; but it is none the less disconcerting to those who use these butters principally because of their supposed freedom from

infection with *B. tuberculosis.—Bacillus Tuberculosis in Butter, J. W. Edington, Lancet, July 14, 1934, ccxxvii, 81.—(B. T. McM.).*

Transmission of Avian Tubercle Bacillus by Eggs.—Twenty healthy, egg-producing hens were artificially infected as follows: 7 intravenously, 7 intramuscularly, and 6 by mouth with material obtained from a naturally infected hen. The entire flock was negative to tuberculin 8 days after infection. Four weeks after infection, 4 of the intramuscularly and 1 of the orally infected hens were positive to tuberculin. Six weeks after infection, the entire flock was positive to tuberculin except 2 of the intravenously infected group. In these 2 birds tuberculous lesions were found at autopsy. All eggs examined before the fifth week were negative. After the fifth week acid-fast granules, about 0.8 micron in size and coccoid in shape, were found in the eggs. Egg material containing these acid-fast granules was injected intraperitoneally into a pullet, a rabbit and a guinea pig. Eight weeks later lesions found in the pullet and rabbit contained acid-fast bacilli. In one bird that died at this time no lesions were found other than a slightly rough, depressed area on the liver. Smears from this area showed no typical bacilli but many acid-fast granules. A pullet injected intraperitoneally with this material showed, after 6 weeks, lesions in the liver and mesentery from which typical tubercle bacilli were obtained on smears. Ninety-three eggs were examined and pure cultures of tubercle bacilli were grown from 13 or 13.96 per cent of them. These eggs were produced by 6 hens, the remainder of the flock having died from various causes or gone out of production too early in the investigation to be of value. The reproductive organs of 12 naturally and 2 artificially infected hens were examined for the presence of tubercle bacilli. No gross lesions were found, but acid-fast rods or granules, or both, were found in cultures from the ovary or oviduct of 12 birds. Upon incubation, 13 chicks were obtained from 34 eggs of artificially infected hens and 18 chicks from 76 eggs of naturally infected hens or about 38 and 23.7 per cent hatchability, respectively, which is very low. Smears from 2 of the eggs containing dead embryos showed tubercle bacilli. Smears of the other unhatched eggs were negative and cultures showed contamination, so that it was necessary to discard them. The chicks obtained were kept, free from sources of infection other than the eggs, as long as seven months without showing typical tuberculosis. Avian, bovine and human strains of tubercle bacilli were grown on 5 types of media under atmospheric tension and 5, 10, and 15 per cent carbon-dioxide tension. Growth appeared earliest on Petroff's egg medium but was heaviest on Lubenau's egg and modified Long's medium. Under 10 per cent carbon-dioxide tension growth appeared in 2 to 3 weeks, much earlier than under the other conditions. With greater effort the percentage of infected eggs found might have been much higher. In view of the close association between the oviduct and cloaca it seems that chance for egg infection is much greater than assumed by some authors. Failure or success in finding tubercle bacilli in eggs must, in some way, be connected with the stage, localization, acuteness or chronicity of the disease at the time of examination. —*The Cultivation and Egg-Transmission of the Avian Tubercle Bacillus, H. J. Stafseth, R. J. Biggar, W. W. Thompson & Lisa Nev, Jour. Amer. Vet. Med. Assn., September, 1934, lxxxv, 342.—(L. F. B.).*

Bovine Tuberculosis in Human Beings in Salonika.—Cultures for tubercle bacilli were made from 375 patients with tuberculosis, of maximum age of twenty years. Three hundred cultures showed macroscopic growth of acid-fast organisms after the tenth day of incubation to the fifty-ninth day. Twenty-seven showed microcultures detectable from the fortieth to the seventieth day of incubation by microscopic examination of the scrapings of the medium. Of these last cultures macrocultures were obtained by transplantation in only 5 cases. In not a single case were the isolated organisms of the bovine type. Without exception they were human tubercle bacilli. This is due to the fact that tubercle bacilli of the bovine strain contained in milk are killed by the heat to which milk in Greece is subjected before human consumption.—*Recherches sur l'éxistence de la tuberculose d'origine bovine, chez l'homme, a Solonique, B. Ananiadès and N. Papanarghyrou, Compt. Rend. Soc. Biol., October 20, 1934, cxvii, 314.—(M. T. W.)*

First-Infection and Reinfection Tuberculosis.—The authors have examined 12,095 children since 1921 and present a study, based on these observations, of the effect of the initial tuberculous infection upon subsequent tuberculous lesions. At Lymanhurst the incidence of positive tuberculin reactors has decreased from 41.6 per cent in 1921 to 23.6 per cent in 1933. The first-infection type of tuberculosis begins to develop in tissue that is not sensitive to tuberculoprotein. The immediate reaction is not specific and, observed from its early appearance over many years, has not been

seen to cause significant destruction. It is benign and is brought well under control in the majority of cases. The tuberculin test is the only fine screen available in the diagnosis of the first-infection type in children. The roentgenogram fails to locate the lesion of first-infection type in 75 per cent or more of the children who react positively to the tuberculin test. In the 25 per cent or less located by roentgen examination the lesions usually are not of clinical significance. Therefore the film gives no information of value beyond that provided by the tuberculin test. The reinfection type of tuberculosis develops on sensitized tissue, which meets it with a specific reaction. The tuberculin test gives no aid in the diagnosis of the reinfection type of tuberculosis. The roentgenogram is the most valuable aid in the detection of the reinfection type. Children and young adults with negative tuberculin reactions so rarely show other evidence of tuberculosis as to make roentgenograms of all negative reactors impracticable. The chronic reinfection-type of pulmonary tuberculosis is not commonly seen under the age of 10 years. In the group studied it occurred only once in each 2,016 examinations. Therefore, to make roentgenograms under the age of 10 years is not practical when funds are limited. After the age of 10 or 11 years, roentgenograms should be made periodically in all positive reactors. The effect of the first-infection type of tuberculosis on the reinfection type has in recent years been studied by five main methods: *1:* Animal experiments have shown that reinfections are met by a specific reaction which is often destructive. *2:* Postmortem examinations have shown that a first-infection type of lesion can nearly always be demonstrated in the bodies of persons who have had the reinfection destructive type of disease. *3:* In from 50 to 75 per cent of cases roentgen study reveals the coexistence of the two types in the same chest. *4:* By observing negative reactors after they become positive, it is possible for one to observe the evolution of tuberculosis in the bodies of human beings from the time when there is no evidence except the positive tuberculin test until the individual has far-advanced pulmonary disease. *5:* By observing children, both positive and negative reactors, over years to determine which group affords more cases of clinical tuberculosis. Of all the children traced at the Lymanhurst School, the authors found that the number of those who had positive tuberculin reactions at the first examination and have subsequently fallen ill, is five times as great as those who had negative reactions at the first examination. The first-infection type of tuberculosis carries a double health liability, first, because in the foci of this type of tuberculosis tubercle bacilli remain alive and virulent over long periods of time; and, second, because allergy results, which is responsible for a great part of the tissue destruction in tuberculosis. The program of tuberculosis control in this country is sound, because it aims to prevent the first-infection type of tuberculosis from developing in the bodies of children and adults. This is a much sounder policy than any method aimed at immunization, which at best is questionable and which allows subsequent contamination.—*The Effect of Initial Tuberculous Infection on Subsequent Tuberculous Lesions, J. A. Myers & F. E. Harrington, Jour. Am. Med. Ass., November 17, 1934, ciii, 1530.*—(*G. L. L.*)

Antituberculosis Vaccination.—Smith studied the tuberculosis mortality from all forms of tuberculosis in the Children's and Infant's Hospitals of Boston, 1923-1933. There was a high mortality rate the first year, rising to a peak in the second, and then rapidly falling to the sixth year when a very low level was reached. The same thing is true of the curve of tuberculosis mortality by ages throughout Massachusetts. The explanation most commonly assumed, of diminished resistance in early life, is not borne out by any experimental work. Nor is there any reason to believe the organisms affecting infants are of any greater virulence; in fact, the bovine strains are definitely less virulent for man. It does, however, seem probable that the relative doses of infection received by infants are larger, both from contact and from infected milk. Curves of the incidence of infection by ages are plotted as shown by the studies of Chadwick and Zacks in Massachusetts with the Pirquet test, and Smith at Bellevue Hospital, New York, using the intracutaneous test. When the mortality curve descends markedly that of tuberculosis infection is ascending. The occurrence of the great bulk of mortality at a later period is not thought to invalidate this line of reasoning, since the type of disease, now apparently due to reinfection or superinfection, changes. Again the cause of breaking down of resistance is not satisfactorily explained. The foregoing reasoning leads to a belief in the probable advantage of some artificial mode of protection for infants, and is supported by animal experiments, those of Calmette and Guérin, Birkhaug and Soper being especially cited. The proponents of the bacillus of Calmette and Guérin believe it proved to assume and maintain the character of a fixed virus nonpathogenic for man and laboratory animals

and since 1921 about a million adults and children have been inoculated, at first orally, latterly by the intracutaneous route, the usual initial dosage being 0.15 mgm., given only to tuberculin-negative individuals who are protected from subsequent contact until a positive skin test appears. Thus far incontrovertible statistical proof of its value is not to be had, but a study of 300 children in New York City and also by Wallgren at Gothenburg, evidences some protection, there having been no tuberculous mortality in the inoculated as against 3 per cent in the controls. The use of heat-killed bacilli also deserves further testing. At Harriet Lane Home in Baltimore about 80 infants have been inoculated, using 0.3 gm. intramuscularly. Final judgment on both methods of inducing relative immunity must be reserved. —*The Clinical Basis and Present Status of Vaccination Against Tuberculosis, C. A. Smith, New England J. M., July 26, 1934, ccxi, 147.*—(*A. P.*)

Antituberculosis Vaccination.—The tubercle bacillus is not normally found in nature and does not propagate outside the human and animal body. However, the organisms are abundantly distributed and transported by civilization throughout the world and there has been no noteworthy reduction of infection. Tuberculin tests indicate its occurrence in about 40 per cent of those reaching puberty, but, if contact is only occasional and the dose small, infection will remain localized, benign or latent. A massive infection may lead to acutely progressive and fatal disease. Hamburger in Vienna has reported the highest proportion of positive reactors in children and, in general, it appears higher in Europe than in the United States. The incidence and severity of infection are materially increased in those brought up in families with tuberculosis histories, and the mortality in those infected the first year is very high, suggesting no appreciable resistance to tuberculosis in very young infants. Prophylactic vaccination dates back almost to the discovery of the tubercle bacillus. There are three possible modes: (1) Using virulent living bacilli; (2) avirulent living bacilli; and (3) heat-killed virulent bacilli. The first method has been tried by a few, without convincing results and is certainly much too risky. The use of heat-killed bacilli began with Koch and was continued by Roemer, who was confirmed by Baldwin, Bessau, Petroff, Zinsser, Branch and others. Langers prepared a suspension from young cultures, which he tested on various animals and with which Zadek and Mayer vaccinated a small number of infants from tuberculous families, with very encouraging results. *Vaccination with living avirulent bacilli: Calmette's BCG:* Calmette in his work used an organism isolated by Guérin from a calf in 1908, of bovine type and moderately virulent for animals prior to its continuous cultivation on glycerinated potato-bile medium, after which it lost its power to produce generalized tuberculosis and, according to Calmette, to form tubercles or set up hypersensitiveness to tuberculin. Petroff has studied 6 different cultures over a period of eight years, three coming from Paris, and one directly from Calmette. The first of these proved quite pathogenic and an occasional guinea pig developed tuberculosis from the others. Petroff explains these discrepancies on the basis of "dissociation." He also failed to find any greater immunity with Calmette's method than with heat-killed organisms. Calmette and Neufeld explained Petroff's results on the basis of contamination, since the pathogenic S variant was virulent only for guinea pigs while the original bovine strain was virulent for rabbits. Petroff, however, believes that there are intermediate forms which undergo metamorphosis. He concludes that the *BCG* vaccine is not safe for wholesale vaccination. —*Antituberculosis Vaccination, S. A. Petroff, New England J. M., October 11, 1934, ccxi, 677.*—(*A. P.*)

Antituberculosis Vaccination.—This preliminary report concerns 73 infants who were inoculated intramuscularly with heat-killed human tubercle bacilli (Langer). In most cases 4 weekly injections of 36 to 120 million bacilli were administered. In 12 per cent of the children cold sterile abscesses developed at the inoculation site. The intracutaneous tuberculin test became positive in from 3 to 13 weeks, demonstrable allergy occurring in 72 of the 73 children. Fifty children, 31 of whom were exposed to active tuberculosis, were observed for more than one year, among whom one death from tuberculosis occurred, a mortality of 2 per cent. The series is small, but the authors received the clinical impression that some degree of protection occurred in the inoculated children and hope to enlarge upon this report later, feeling that this method is much less open to criticism than the injection of living attenuated organisms.—*Protective Inoculation Against Tuberculosis in Infants by the Use of Heat-Killed Human Tubercle Bacilli, T. C. Goodwin & F. F. Schwentker, Jour. Ped., October, 1934, v, 475.*—(*M. D.*)

New Immunizing Vaccine.—Culture of human, bovine and avian tubercle bacilli obtained in 1906 and subcultured for twenty-

eight years, became attenuated and avirulent for susceptible animals. The vaccine is prepared by heating organisms for one hour at 60°C. on four successive days. The cultures are dried in a vacuum drying oven. The mass is triturated until a sufficiently fine powder is obtained. The stock suspension represents 1 mgm. of bacillary powder per cc. of sterile salt solution containing phenol 0.5 per cent and glycerine 30 per cent. The course of veterinary immunizing vaccine consists of two doses, each 0.2 mgm., prepared from avirulent human bacilli. The prophylactic and treatment course for human use consists of graduated doses, twelve in number, prepared from attenuated avirulent cultures of bovine bacilli. The special variety of tuberculin (vaccine) to be used must be determined by the nature of the infection. In cases of tuberculosis caused by the human tubercle bacillus it is necessary to use a tuberculin prepared from the bovine tubercle bacillus and *vice versa*. Bovine tuberculin is less irritating and less liable to produce reactions when given in the larger doses in cases of human tuberculosis. Sixteen hundred patients were treated and the injection of tuberculin was found to be a remedy of the greatest value. Tuberculin is not going to revolutionize the treatment of tuberculosis. It is a valuable aid to other methods of treatment; hence it must be used with care and discrimination, and with a full knowledge of its dosage and therapeutic effects.—*A New Immunizing Vaccine for the Prevention and Treatment of Tuberculosis, N. Raw, Brit. J. Tuberc., October, 1934, xxviii, 162.*—(*F.G.P.*)

Antiseptics for Tubercle Bacilli.—The methods used in this study may be classed under three groups as follows: (1) tuberculocidal-static tests; (2) tuberculocidal-time tests; and (3) tuberculocidal-time in the presence of body fluids (blood was used). The results of this study show that while some of the preparations tested reveal a high tuberculocidal-static value [merthiolate 0.1 per cent, with heavy seedings; "Solution S. T. 37" (0.1 per cent crystalline hexylresorcinol dissolved in 30 per cent glycerol water), Di-hydranol 0.1 per cent, and methyl and ethyl mercuri-succinimido-aurate 0.1 per cent] others, such as acriflavine, mercurochrome, sanocrysin and phenol, reveal no effect in the concentrations (up to 1 per cent) used. It was also noted that while some of these compounds produce no effect on large numbers of bacilli one of them (metaphen 0.001 per cent) was detrimental to small numbers of bacilli (0.000,01 mgm.). The tuberculocidal-time value may be considered more exact in evaluating antiseptic values than the tuberculocidal-static test. The concentrations used in the tuberculocidal-time test were those recommended by the manufacturer or those found best suited from deductions derived from the tuberculocidal-static tests. The results of the tuberculocidal-time values indicate that merthiolate proved of no tuberculocidal value within sixty minutes for large numbers of tubercle bacilli, although the static value may be fairly high. For small numbers of bacilli a tuberculocidal action is exerted after about fifteen to twenty minutes. The same conclusion applied to methyl or ethyl mercurisuccinimido aurate; "Solution S. T. 37" and Di-hydranol, however, showed in contrast a high tuberculocidal efficiency, killing even heavy concentrations of bacilli within about ten minutes and lower concentrations of bacilli within two minutes. Mercurochrome (2 per cent) and acriflavine (0.1 per cent) and ethyl alcohol (20 per cent) proved innocuous within one hour's exposure. Metaphen in tuberculocidal tests killed in 30 minutes heavy concentrations of bacilli while few bacilli were killed within five minutes. Ethyl alcohol, 95 per cent, killed all concentrations of bacilli within five to ten minutes, while phenol (5 per cent) killed almost on contact. In the presence of blood the tuberculocidal values for some of the preparations change markedly. "Solution S. T. 37" and Di-hydranol proved highly inefficient in the strength available for practical use. On the other hand merthiolate (0.1 per cent) and metaphen (0.1 per cent) proved tuberculocidal for either large or small numbers of bacilli after about one hour of contact in the presence of blood.—*The Antiseptic Effect upon Tubercle Bacilli of Certain Recently-Advocated Compounds, M. L. Cohn, J. Bact., May, 1934, xxvii, 517.*—(*F. G. P.*)

Value of Preventorium Work.—Results for a ten-year period of preventorium work are reported. Seven hundred and five children in definite contact with open cases of tuberculosis and with positive Pirquet reactions, form the basis of this study. They were admitted between the ages of seven and twelve years and some were readmitted as often as four times. All showed definite X-ray evidences of tuberculous infection. Two hundred and ninety-two showed some signs of being undernourished, 91 were below par in both development and nutrition, and 68 were distinctly poorly developed and undernourished. On discharge all those who had been below par showed definite improvement. Many who had not done well in public school improved in their work, and 90 per cent were promoted at the pre-

ventorium school. An after-care worker visited all discharged children in the home and arranged for medical supervision and elimination of the original source of the child's infection. Of the group of 705 children, only 29 could not be traced. One is known to have died of tuberculosis and two others developed pulmonary tuberculosis and received sanatorium treatment. Of the persons who were the original source of infection, 65 per cent had died before the child's admission and in 267 cases they had received sanatorium treatment. In 109 cases, in which no sanatorium treatment had been received, the children were in no worse condition than when the exposure to infection had been less prolonged. This is attributed to the ability of the follow-up nurse to bring about intelligent coöperation on the part of the family in the home. Since the standards of living and health and happiness of both family and children were markedly improved as a result of the teaching and care received at the preventorium, it is worth while and should be continued.—*A Study of Ten Years' Work at the Prendergast Preventorium of the Boston Tuberculosis Association, J. B. Hawes, 2nd, N. K. Wood & D. S. King, New England J. M., June 21, 1934, ccx, 1321.* —*(R. C. S.)*

BCG.—This is a statistical analysis of the progress of over 1,000 children, some of whom had received *BCG* (by mouth, subcutaneously, or intracutaneously), others serving as controls. Many factors were considered in the study, including type of tuberculous exposure, age of children at time the vaccine was administered, etc., as well as clinical and, in some cases, X-ray observations. From the analysis of the group as a whole, vaccination with *BCG* was seen to be not only harmless but apparently decreased the mortality due to tuberculosis. A detailed analysis of observations on 95 children, all of whom were known from birth and all exposed to open tuberculosis within the first year of life, indicated that the mortality due to tuberculosis was 1.9 per cent in the children receiving *BCG* and 9.7 per cent in the controls.—*Fate of Children in Tuberculous Families, Including Those Treated and Those not Treated with BCG, C. Kereszturi, Wm. H. Park, P. Vogel, & M. Levine, Am. J. Dis. Child., September, 1934, xlviii, 507.*—*(M. D.)*

BCG.—That human beings acquire a certain increased resistance by means of a *BCG* vaccination resulting in tuberculin sensitization has been proved by Heimbeck's experiments on tuberculin-negative probationary nurses at Oslo. Out of 136 nurses vaccinated, only three became ill after having attended tuberculosis patients, while of the 34 unvaccinated probationers, unaffected when they began duty, not less than fourteen fell ill with tuberculosis. In Gothenburg, since 1928, every child considered by the municipal dispensary to be in danger of infection has been vaccinated. Up to the end of December, 1933, the number of children vaccinated amounted to 355. For various reasons, among others the death of the source of infection, 123 of these children had not yet been exposed to tuberculous infection after vaccination. Three of these 123 children have died and have been examined postmortem. The cause of death was nontuberculous in all three. Two other children died of nontuberculous causes before the vaccination had conferred tuberculin sensitiveness. Of the children who had been exposed, only two died. Thus, altogether, only seven of the 355 inoculated children have died. The following particulars are still more instructive: Out of 117 children who were vaccinated at birth and who at the last after-examination were at least one year of age, only four had died in their first year of life. This corresponds to a mortality rate among infants of only about 3 per cent. The method of caring for the children in an institution or private home until the vaccination has taken has accordingly not involved any increased risk for the child. The living children, numbering 120, who have not yet been exposed, were all in good health at periodic reëxamination. The children who are of most interest are, of course, those, numbering 230, who have been exposed to tuberculous infection after being vaccinated. Fully one-third of all the children were vaccinated shortly after birth, while but a small number were vaccinated during school age. No child was exposed until after one and one-half months following vaccination, only six at the age of 6 weeks, while forty-five were exposed under the age of 3 months and seventy-nine under the age of 6 months. On the other hand, the exposure of some was delayed until they were more than 2 years of age. The shortest period of exposure was fixed at two months. Nearly three-fourths of all children exposed during the first year of their lives have been exposed for a period of more than twelve months and some of them up to from six to seven years. All vaccinated children are examined at least once a year and are besides kept under the regular supervision of the dispensary. An after-examination that is not based on a roentgen control is unreliable and is of no real value from the point of view of morbidity. All children vaccinated with *BCG* at Gothenburg have been examined roentgeno-

logically at least once a year. Only one of the 230 exposed children exhibited roentgenologically decided tuberculous infiltration of the hilum. Subsequent roentgen examinations have disclosed a rapid disappearance of the density of the hilum, so that a year after its manifestation the roentgenogram showed an almost normal condition. In 4 cases the hilum shadows were slightly larger than normal, but in three of them the patient had had pertussis or pneumonia before the examination, and not one of these 4 children had exhibited any symptoms suggestive of primary tuberculosis. In seven of the cases it was not possible to decide whether the hilum shadow was normal or not. In the remaining 216 children alive at the time of the last reëxamination the roentgenograms showed absolutely normal conditions. Only two out of the 230 children exposed have died, neither of them from tuberculosis.—*Value of Calmette Vaccination in Prevention of Tuberculosis in Childhood, A. Wallgren, Jour. Am. Med. Ass., November 3, 1934, ciii, 1341.*—(*G. L. L.*)

***BCG* in Rabbits.**—A study was made to determine to what extent *BCG* multiplies in the various organs and lymph nodes of rabbits, how long it remains viable within them, and what histological changes are associated with the fate of the bacilli. Three series of 12 rabbits were inoculated intravenously with a strain of *BCG* obtained from the Pasteur Institute in Paris in 1928. One and 3 days, and 1, 2, 4 and 8 weeks following inoculation, 2 rabbits of each series were killed; weighed amounts of ground lung, liver, kidney, spleen and bone-marrow in various dilutions, and a measured quantity of blood from the heart, were seeded on modified Loewenstein's medium, directly, and after treatment with 6 per cent sulphuric acid. In series II and III, ground tracheobronchial and mesenteric lymph nodes, and in series I, bile from the gall-bladder were also seeded in a similar manner. The number of colonies on the surface of each tube were repeatedly determined and the final reading was made after 3 months' incubation. Another group of rabbits was similarly inoculated and kept for 14 months to determine how long the strain would persist. The tissue immediately adjacent to that cultured was studied microscopically. *Results:* For some time after inoculation into rabbits the *BCG* multiplies in various organs of the body. As with more virulent tubercle bacilli, the greater the primary deposition of bacilli, the more rapid is their initial growth and the earlier is the beginning of their destruction. Destruction sets in synchronously with the development of definite hypersensitiveness to tuberculin. With the smallest deposition destruction begins at once in the lungs and liver without preliminary multiplication. However, multiplication always takes place in the lymph nodes. It continues here and in the spleen at a time when other organs have acquired sufficient immunity to reduce the number of bacilli considerably. However, by the end of the fourth week, simultaneously with the development of marked hypersensitiveness to tuberculin, the lymph nodes and spleen acquire sufficient immunity to bring about all but complete annihilation of bacilli. Isolated microörganisms persist in the lymph nodes even 14 months after inoculation. These bacilli do not acquire any added virulence because of their long residence in the body. The primary growth of the bacilli is associated with a local accumulation of mononuclears into nodules and their multiplication by mitosis, and the destruction of the bacilli with the formation of epithelioid and giant cell tubercles. These changes may be extensive. The secondary invasion of the tubercles by the polymorphonuclears, their death, exudation of serum and cells into the alveoli of the lung, and caseation in the lymph nodes occur simultaneously, and are synchronous with development of hypersensitiveness to tuberculin. Softening does not occur. All the tuberculous changes, including the caseous foci in the lymph nodes, usually resolve completely by the end of the second month after inoculation without leaving any fibrous scars, although perivascular accumulation of mononuclears may still remain. The few bacilli that persist in the lymph nodes after this period cause no tuberculous changes.—*The Fate of BCG and Associated Changes in the Organs of Rabbits, M. B. Lurie, J. Exper. Med., August 1, 1934, 163.*—(*J. S. W.*)

Dissociation of *BCG*.—Three cultures of *BCG* from different sources were examined. These, when plated by a method enabling the study of single colonies, produced exclusively R forms and were agglutinated in buffer solutions of relatively low hydrogen-ion concentration (pH 4.4–4.8). The two cultures, *BCG* 439 and *BCG* 394, tested by inoculation, proved to be avirulent for guinea pigs and rabbits under the conditions of experiment. The properties of the R organisms agreed with the descriptions given by most workers. Neither by growth over five successive transfers on egg media of reaction ranging from pH 6.1 to pH 7.8 or to whose surface various filtered normal (horse, ox, rabbit, sheep) sera had been added, nor by growth over three to seven transfers on a modified Sauton's medium

(pH 7.2–7.4), alone or containing these various sera in 10 per cent amount, was it possible to induce the production of S forms with increased virulence. In a small series of experiments neither the simultaneous injection of living *BCG* R and heat-killed S organisms obtained from deep cultures subcutaneously into guinea pigs nor the introduction of living *BCG* cultures into rabbits which had previously been immunized with heat-killed homologous organisms, resulted in reversion to a virulent form. Two cultures of tubercle bacilli which had been isolated by Dreyer and Vollum from animals inoculated with *BCG* grown in the depths of broth were also examined. These when first plated out on Petroff's egg medium (pH 7.0–7.4) produced only S colonies, were agglutinated in buffer solutions up to pH 3.2–3.4, and were moderately virulent for guinea pigs, though less so for rabbits. From them it was possible to obtain R variants resembling *BCG* in appearance by growth on egg media with reaction of pH 6.1–6.6. Determination of the *in vivo* relationships of the two forms was rendered difficult by their instability and by the effect of the method of treatment of tissues on the colony forms developed.—*Experiments with B.C.G. Cultures, M. F. Shaffer, J. Path. & Bact., January, 1935, xl, 107.*—(*E. R. L.*)

Dissociation of *BCG*.—The dissociated forms of *BCG* were studied for three years. Contrary to Petroff, it was shown that these variants were not capable of producing tuberculous lesions in susceptible animals. Two strains of *BCG* with their dissociated forms are discussed in this report. One was isolated from a transplantation of secondary colonies that appeared on a culture allowed to grow at room temperature instead of in the incubator. The second strain with its variants was obtained from a blood culture from a chimpanzee six hours after having received 1 gm. *BCG*. From this blood-culture 4 typical variants were recovered, the smooth (S), the chromogenic (Ch) producing yellow pigment, the flat-smooth (FS) and the rough (R). Once isolated these variants showed a remarkable stability. After 21 subcultures made every twenty days on potato-glycerine medium, their specific characteristics remained unchanged. The R colonies looked exactly like cultures of human tubercle bacilli and, like the original *BCG* from which they grew, they were nonpathogenic for animals susceptible to tuberculosis. Rabbits tolerated intravenous inoculations of 0.001 to 0.01 mgm. of the variant S without showing any lesions. Guinea pigs tolerated subcutaneous doses of 0.000,001 to 0.1 mgm. equally well. Depending upon the dose the animal became progressively allergic. The allergic state reached its maximum and disappeared. The disappearence coincided with its recovery. These guinea pigs reacted more markedly to homologous tuberculin than to the raw tuberculin of Koch or the tuberculin prepared from the corresponding R variant. Guinea pigs, inoculated intraperitoneally, behaved in much the same manner. Those inoculated intravenously gave a more pronounced allergy. With doses of 1 to 5 to 10 mgm. and upward, the S variant produced in the guinea pig an abscess at the site of inoculation which sometimes opened spontaneously to the exterior, exuding caseous pus containing acid-fast bacilli. A certain number of guinea pigs died fifteen days to six weeks after inoculation. They showed inflammatory and congestive lesions of the spleen, liver, kidneys, lungs and capsule of the adrenal. Blood-cultures showed no acid-fast bacilli. Cultures of all the organs and in some cases of the bone-marrow yielded pure cultures of the variant S. By intraperitoneal inoculation of the same dose, the same type of lesions was produced but in lesser degree and, in addition, the omentum, massed against the stomach and adhering to the liver, spleen and small intestine, was dotted with small caseous abscesses. Often exudate was formed in the peritoneal cavity. The guinea pigs, resistant to large doses and killed after several months, presented only subcutaneous abscesses or nodules in the omentum containing acid-fast bacilli. Finally 100 guinea pigs were inoculated by various methods,—into the sole of the foot, the eye, the brain, lymphatics and the skin. No tuberculous lesions resulted. These experiments show that the dissociated forms of *BCG* are not capable of producing tuberculous lesions in susceptible animals, the variant S being more virulent for the guinea pig than the R variant.—*Propriétés biologiques des colonies dissociées R et S de la souche de Calmette et Guérin (BCG), A. Saënz & L. Costil, Compt. Rend. Soc. Biol., July 21, 1934, cxiv, 1265.*—(*M. T. W.*)

Dispersion of Tubercle Bacilli in Infants.—Fourteen infants, all of whom had received *BCG* at birth, and a foetus were examined postmortem for tubercle bacilli throughout their bodies. Cultures, histological examinations and guinea-pig inoculations were made. Seven of these babies had positive tuberculin reactions, and seven were born of tuberculous mothers and had negative tuberculin skin tests. In the latter group of the 70 tests made from various tissues and organs none were positive. The foetus gave entirely negative results while cultures of the placenta yielded many colo-

nies of tubercle bacilli. In the former series of which three had died of their tuberculosis, there were 13 positive results from the 70 tests, eleven of which were from the infants dead of tuberculosis. Two of these cases showed generalized tuberculous lesions. This leaves only 2 positive results out of 46 tests when death was not caused by tuberculosis. A pair of twins having contact with a tuberculous father was included in this latter group. Cultures and animal inoculation of a slightly enlarged splenic zone and of the hilum were positive in one twin. The kidney showed discrete histological tuberculous lesions. In the other twin enlarged lymph nodes with secondary lesions in the lung were found. No other lesions were found. All tests were negative with the exception of the culture and guinea-pig inoculation of the spleen. *Conclusions:* In initial tuberculosis in infants the blood-stream migration of the bacilli is transient and weak, numerically speaking. This dispersion may occur preceding the development of the allergic state or during the evolution of the initial lesion. In this case, the bacillary discharge was weak and infrequent, and rare bacilli carried to the organs are without doubt promptly destroyed.—*La dispersion du bacille de Koch jugée par l'étude bactériologique et histologique des tissus prélevés post mortem. Résultats obtenus chez les nourrissons issus de parents tuberculeux et chez les nourrissons attients de lésions initiales de tuberculose, R. Debré and Perrault, Comp. Rend. Soc. Biol., January 5, 1935.*—(*M. T W*)

Childhood-Type Tuberculosis.—Two questions were submitted to state health officers: (1) is the childhood type of tuberculosis reportable under the laws of your state? and (2) how many cases of childhood type of tuberculosis were reported in your state in 1932? In many replies confusion was apparent between "childhood type of tuberculosis" and "tuberculosis in childhood." On the whole, the replies indicated that no general effort is being made by physicians to report the childhood type of the disease. From the interpretation of the 48 replies received it was concluded that in 43 of the states no specific law or regulation is considered as requiring reporting of the childhood type, although most states require that tuberculosis in general be reported. The author holds that under present conditions the childhood type of tuberculosis should not be made specifically reportable. It is impossible to tell which cases will develop clinical tuberculosis. The epidemiological value of reports is low, because in only half of the cases can family contact be traced. The inclusion of childhood-type tuberculosis in the official reports would make a lop-sided picture in the communities where intensive case-finding programs are under way.—*Official Reporting of Childhood Type of Tuberculosis, Jessamine S. Whitney, Am. J. Pub. Health, August, 1934, xxiv, 850.*—(*E. R. L.*)

Lipoid-Cell Pneumonia in Children.—Proliferative pneumonia following aspiration of fatty material, recognized for some years as a pathological entity, may be recognized clinically also. The onset is usually insidious. Rapid respiration without dyspnoea, and a persistent hacking cough are the two most frequent complaints, although in the less severe cases there may be no symptoms referable to lungs. In uncomplicated cases there is no fever. In some of the more chronic cases, there is a failure to gain weight. Physical examination of the chest reveals dulness, some diminution in breath-sounds, and often fine or medium-sized râles. As in childhood tuberculosis, there are fewer physical signs than might be expected from the amount of lung involved. X-ray pictures, including lateral plates, are typical, revealing large areas of consolidation with a "foreign-body" distribution, especially when the process is extensive. There is usually more involvement on the right than the left, upper more than lower, and posterior more than anterior. The diagnosis of lipoid-cell pneumonia should be suspected especially when successive roentgenograms show little change in the size of the lesion. Unlike tuberculosis there is very little mediastinal-node enlargement. The patients usually have some associated illness and fall into three groups: First, cases of meningitis, brain tumor, etc., in which loss of consciousness favors a diminished cough reflex and the aspiration of food or medication; second, debilitated infants in whom vigorous coughing is impossible or who lie continually on their backs, thus favoring the aspiration; and third, children subject to persistent vomiting for one reason or another. Various oils are responsible for the process, particularly milk fat, and also cod-liver oil and mineral oil. Calcification in the lungs (but not in the bronchial lymph nodes) may occur. Cavitation is not seen. The prognosis is good, treatment consisting of good nursing care with frequent change of position, and avoidance of upper respiratory infection. To prevent the condition one should avoid the use of oily nose drops or laxatives in small or weak infants, and substitute a vitamine-D concentrate when cod-liver oil is taken with a struggle. Proper precautions should be taken in gavage or in caring for children who are inclined to vomit.—*Lipoid Cell Pneumonia, T. C.*

Goodwin, Am. J. Dis. Child., August, 1934, xlviii, 309.—(M. D.)

Pott's Disease in Children.—This is still one of the commoner conditions seen by orthopaedic surgeons. Of 184 children with tuberculous joints treated at the New England Peabody Home for Crippled Children from 1920 to 1930 inclusive, 89 had tuberculosis of the spine, the average age of the patients being about five years. It is significant that weight-bearing joints are most commonly involved, 50 per cent being spinal, with the hip second and the knee third. From 1920 to 1924 the average prior duration of disease was 26.5 months, and from 1925 to 1930, 18.5 months, a significant decrease which is encouraging. *Pathology:* Doub and Badgley have, on the basis of roentgenological studies, posited three types of tuberculosis of the spine,—central, intervertebral and anterior, the first being most common, and the last least so. In this series there were 32 intervertebral, 31 central, 1 anterior, 8 combined intervertebral and central, 2 combined anterior and central. The most marked deformities occur in the central type, and where there is marked destruction posteriorly. Mobile spinous processes indicate rapid destruction and in this type radical measures should be adopted as soon as possible. Every effort should be made to check deformity and prevent collapse of the vertebral bodies. If they be efficiently splinted apposition is not necessary for healing. Localization of the process is the rule. In this series 4 were cervical, 4 cervicodorsal, 47 dorsal, 18 dorsolumbar, 13 lumbar, and 3 lumbosacral. *Signs and symptoms:* Pain on motion, muscle-spasm and deformity were most common. Thirty-seven referred pain to the site of the lesion, and 8 elsewhere. Thirty-three were recorded as having muscle-spasm and it was probably present in more, while 71 presented some degree of kyphos. Less common were limp, night-cries, tenderness and pressure symptoms, but 7 had definite changes in motor reflexes. In most cases a fairly conclusive diagnosis is possible by history, physical examination, and X-ray. The added presence of an abscess containing calcium is almost conclusive, while a positive intracutaneous test with 0.1 mgm. tuberculin is strongly confirmatory. When abscess is present, aspiration and guinea-pig inoculation establish the diagnosis beyond question. Seventy of the 89 cases had abscesses demonstrable by roentgenogram, and in 24 there was clinical evidence manifested by swelling, pressure symptoms or a draining sinus. Twenty-two showed both clinical and X-ray evidence. The location of the abscess largely determines its behavior. When arising from lesions of the cervical spine it readily invades the mediastinum, producing symptoms of dysphagia or dyspnoea. Drainage of these abscesses is rarely necessary, as they tend to diminish and calcify, or even disappear, under conservative treatment. Abscesses of the dorsal spine usually remain localized and may cause pressure symptoms and increased deformity. In anteroposterior roentgenograms they are visible lateral to the vertebral column, dissecting up and down the spine under the anterior common ligament. Of 47 dorsal and 4 cervicodorsal lesions, 33 showed abscesses by X-ray but only 4 showed clinical evidence. There was X-ray evidence in all of 18 dorsolumbar lesions, and clinical in 7. In 9 cases the abscess went through the diaphragm. In 13 lumbar lesions there was X-ray evidence of 12, and clinical of 10. *Treatment:* In acute cases the patient is placed on a Bradford frame, and, as symptoms become more quiescent, hyperextension is gradually started by bending the frame 20° or 30° at the desired level. Later plaster shells are used, the anterior one made with the patient supine and in extreme hyperextension. The shells run from the chin to below the knees, with thighs slightly abducted. The posterior shell is made on the patient lying on the anterior shell, or a split plaster jacket is used for low lesions. It is not expected that the kyphos will diminish unless seen very early but it is hoped to prevent increased deformity. The child is continuously on one shell or the other, even for bathing and use of the bed-pan. The average period of recumbency for 74 cases was thirty-three months. *Operative surgery:* This is rare in children under five years but possibly fusion should be adopted earlier. The following are prerequisites: (1) good state of nutrition, (2) absence of fever, (3) normal blood, (4) absence of pain on passive motion, (5) absence of muscle-spasm, and (6) X-ray evidence of healing, or at least, arrested progress of the disease. Deformity increasing despite hyperextension is an indication for operation. Prior to operation, patients are allowed up two to four hours daily for six weeks, wearing a plaster jacket, as such a procedure helps them to stand operation better. A modified Hibbs fusion technique is used, with an osteoperiosteal graft in addition to feathering of the spinous processes and laminae. The patient lies in bed on an ordinary mattress for ten days following operation and is returned to the shell when soreness subsides. Serial X-rays have shown evidence of new bone-formation by the end of the second month. At the end of a year this becomes solid. After this

period they are allowed up with a long back brace to prevent the graft bending or breaking and this is worn until puberty. *End results:* These were excellent in 18, with good general condition and healing of the local lesion. Three had persistent slight deformity; all but 2 of this group were treated nonoperatively. Results were good in 26, of whom 5 had fusion operations at the time of this study, and 7 since; these patients had persistent slight deformity. Results in 10 were fair, all having rather marked deformity; four of this group were fused and this is being considered in the others. In 10 cases they were rated poor because they developed progressive and rather extreme deformities, two were fused and two others will be. In 5 cases the end-results were unknown. Death occurred in 28 and amyloid disease was frequent. *Operative results:* Of 15 cases of spinal fusion done by the end of 1930, 13 were done at the institution and 2 elsewhere. Among the 13 the results were uniformly good, all obtaining solid fusion clinically, one showing a defect by X-ray. All healed primarily without sinuses and all are ambulatory and in good condition. Eleven are still wearing braces as a precaution. One died of postoperative shock.—*Tuberculosis of the Spine in Children, E. F. Cave, New England J. M., Sept. 27, 1934, ccxi, 578.—(A. P.)*

Excretion of Virulent Tubercle Bacilli by Indian School-Children.—In 1927 Ferguson found that 85 per cent of Indian homes in Saskatchewan, Canada, lacked the simplest forms of sanitation, and the possibility of contamination of premises about their huts and infection from polluted soil was considered a probable source of danger. He found infection prevalent in Indian boarding-schools, from which children with known open tuberculosis were excluded, but certain children, thought to be noninfectious, were retained. However, children negative to tuberculin on admission usually became positive within a year or two, and a few developed active and progressive disease. The source of this infection became a question which prompted the present study. *Procedure: 1:* From 31 healthy tuberculin-sensitive Indian children without demonstrable tuberculous lesions specimens of faeces were obtained, and guinea pigs inoculated with concentrated material. Autopsy of 28 animals living five to eleven weeks revealed no tuberculosis. *2:* Children with definite but apparently closed pulmonary lesions were considered next. They included (1) closed pulmonary cases, inactive; (2) closed pulmonary cases, judged active by X-ray; and (3) closed pulmonary cases active both clinically and by X-ray. From 40 children, 84 specimens of urine were used to inoculate guinea pigs. Of 80 animals, surviving six weeks or more and coming to necropsy, 6 were found tuberculous, and these had been inoculated with the urine from 5 children. From the same 40 children, 96 specimens of faeces were used to inoculate guinea pigs. Of 78 animals surviving six weeks or more and coming to necropsy, 10 were found tuberculous, inoculated from 8 children. Thus, 11 of 40 children had excreta containing virulent tubercle bacilli; 3 having positive urine only, 6 positive faeces only, and 2 positive faeces and urine. Thus, 12.5 per cent of children with presumably closed pulmonary tuberculosis were found to excrete virulent tubercle bacilli in the urine, a figure comparable to that of Harris for 67 children suffering from bone tuberculosis; and 20 per cent excreted virulent tubercle bacilli in the faeces, probably because of their swallowing sputum, an opinion supported by Stewart's findings in stomach washings among patients acknowledging no sputum. In all, of the 11 children with positive excreta, 3 had minimal pulmonary lesions classified as latent clinically and roentgenographically; 2 others also had minimal lesions, with one case showing slight symptoms, and the other X-ray evidence suggesting activity. Conversely, of 21 closed cases with latent lesions and no symptoms, 5 showed virulent tubercle bacilli in their dejecta, while 5 out of 10 closed cases with slight evidence of activity showed infectious excreta. In all, 27.5 per cent of the group studied were found to be excreting virulent tubercle bacilli, a potential source of infection under primitive living conditions, although possibly not so in schools with good sanitary facilities. On the other hand, pulmonary tuberculous lesions may not remain closed continuously, and intercurrent infections, especially of the respiratory tract, may result in transient activity and also in droplet transmission of tuberculous infection.—*A Study in the Occurrence of Virulent Tubercle Bacilli in the Excreta of Tuberculous Indian Children, A. B. Simes & L. E. Paynter, Tubercle, August, 1934, xv, 498.—(A. P.)*

Veterinary Committee on Tuberculosis.—Tuberculin-testing of 14,887,746 cattle during the year ending June 30, 1934, disclosed 1.6 per cent positive reactors. There were at that time about thirty-nine million cattle under supervision for tuberculosis eradication. Although reports of the U. S. Bureau of Animal Industry show a reduction of tuberculosis in hogs, it remains a source of concern in some sections, due to the preva-

lence of avian tuberculosis to which swine are susceptible. Tuberculosis in poultry is very prevalent in the middle western and north central states. About one million cattle in 8 states were tuberculin-tested, with funds from the Civil Works Administration, and with the extra work that is being done the outlook for complete initial testing of herds in the country is promising.—*Report of the Special Committee on Tuberculosis, A. E. Wight, W. H. Feldman, W. Moore, T. O. Brandenburg & T. E. Robinson, Jour. Am. Vet. Med. Assn., October, 1934, lxxxv, 527.*—(*L. F. B.*)

Vaccination of Cattle against Tuberculosis.—Continuous attempts have been made to devise a practical method for the vaccination of cattle. Relatively few attempts have been made with killed organisms. When rendered inert by heat the vaccine only modified an acute and rapidly fatal tuberculosis into a chronic progressive form and, when chemicals were used, the vaccine retained only slight immunizing properties. A diaplyte vaccine, consisting of killed human bacilli with a large proportion of the fats extracted, has been used and the apparently good results of nine years experimentation have been recently reported. Animals may be protected by using virulent bacilli if the vaccinating dose can be precisely judged so as to exclude the possibility of producing actively progressive disease. The use of human bacilli is capable of producing marked increase in resistance to artificial infection where given intravenously. While the resistance is of short duration and produces no significant lesions, the vaccinating organisms circulating in the blood are alive and active and constitute a source of danger through the milk. For this reason the method was abandoned. Vaccinating by mouth also produced a marked increase in resistance in most cases. Low-virulent human bacilli and avian bacilli have been employed with fair but usually transient results. The use of living virulent bacilli in appropriate doses is capable of producing an increased resistance but the method is too dangerous for practical purposes. Various methods to attenuate tubercle bacilli have been tried, but it has been shown that these organisms may regain their normal virulence after a few passages through susceptible animals. Recently the problem of protective immunization has centered around *BCG* and is still unsettled. Experiments were undertaken to ascertain whether *BCG* raised the resistance of calves to tuberculosis and the best method of administration. Fifty-one calves were vaccinated as follows: 10 by feeding, 4 intratracheally, 3 subcutaneously, and 34 intravenously. They were subsequently tested, with 14 untreated calves, by the intravenous injection of virulent bovine tubercle bacilli. The controls died within 27 days. Those vaccinated by mouth showed no appreciable increase in resistance. The remainder lived for various periods up to 4 years when they were killed and examined. Of the subcutaneous group, one showed no increased resistance, and one a very slight, and one a moderately high degree of resistance. Of the intratracheal group, two showed no increase, one a moderate increase, and one, killed 698 days after the test-dose, showed moderate lesions. Of the intravenous group, all but one showed increased resistance but there was great individual variation in the degree of resistance. Thirty-two of this group were vaccinated twice with increasing doses of *BCG*. These animals were killed at varying intervals from 33 to 617 days following the test dose and showed various types and stages of tuberculosis in various parts of the body. Eight calves, negative to tuberculosis, were used next. Six were vaccinated by the double intravenous method and two were used as controls. The control calves showed moderate infection 172 and 194 days after the test dose. The vaccinated calves were free from tuberculosis, with the exception of a few doubtful foci in two, 173 to 204 days after the test-dose. Although these results are satisfactory it remains to be determined how long the immunity persists and the best method of revaccination. Solid immunity appears to persist for at least 6 months.—*Some Aspects of the Vaccination of Cattle against Tuberculosis, J. B. Buxton, J. of State Med., September, 1934, xlii, 527.*—(*L. F. B.*)

Virulence of Tubercle Bacilli in Mesenteric Lymph Nodes in Cattle.—It has been shown in studies on human beings, dead of tuberculosis, that frequently the muscles and especially the lymph nodes contain tubercle bacilli. In cattle with generalized tuberculosis there has also been found in a high percentage of cases virulent tubercle bacilli in healthy-appearing lymph nodes. Thirty-one cattle with localized pulmonary tuberculosis were examined for the presence of living tubercle bacilli in their mesenteric lymph nodes. The lymph nodes, all grossly normal and microscopically free from acid-fast bacilli, were removed with aseptic precautions, and cultured and inoculated into 2 guinea pigs. One month after inoculation a tuberculin skin-test was made. Only one guinea pig showed a weakly positive reaction. This guinea pig and three others had at autopsy splenic enlargement. The spleen of

the guinea pig which had reacted to tuberculin was examined microscopically for acid-fast bacilli. A rare one was found. This was the only guinea pig which was considered to be positive among all those studied. These findings do not agree with other workers who had isolated bovine tubercle bacilli from twenty-five of the 30 cattle considered healthy by the sanitary inspector. With the object of verifying the results of localizing tuberculosis in guinea pigs, 12 animals were inoculated in the conjunctiva with a drop of a suspension containing 1 mgm. per cc. of virulent tubercle bacilli. These guinea pigs were killed two to three months later. Marked hypertrophied cervical lymph nodes sometimes forming a caseous mass were found. No other tuberculous lesions could be demonstrated. From these guinea pigs the mesenteric lymph nodes were removed aseptically and inoculated into other guinea pigs, 2 animals per each node. Four died several days later from nontuberculous causes. Of the eight which died two to four months later none showed any gross tuberculous lesions, and no acid-fast organisms were recovered from the liver, spleen or lungs. Six guinea pigs had tuberculosis. They had been inoculated with lymph nodes of 3 different guinea pigs. The difference in results obtained with guinea pigs and cattle explains the difference in character of the tuberculous infections of these animals. In the former the bacilli inoculated into the conjunctiva do not localize in the corresponding lymph nodes but invade the spleen and lungs. With cattle, on the contrary, an infection of the lymphatic system tends to limit itself to the lymph nodes nearest at hand, while the more distant lymph nodes more often escape infection. In view of these experiments regulations should be made for the partial seizure of beef in the case of tuberculosis apparently localized in a single organ.—*Sur la virulence des ganglions mesentériques chez les bovidés atteints de tuberculose pulmonaire, U. Battaglini, Compt. Rend. Soc. Biol., February 9, 1935, cxviii, 506.*—(*M. T. W.*)

Tuberculosis in Goat.—There can scarcely be any doubt that other susceptible species, as swine, goats, horses, cats, dogs, sheep, and captive wild species are capable of becoming a definite hazard to cattle when in contact with them. The owner of an accredited herd purchased a female goat in May, 1933. A tuberculin test on October 10, 1933, disclosed 13 reactors out of 17 cattle tested. These were replaced from negative herds. On January 14, 1934, 15 or 17 cattle tested were positive reactors to tuberculin. Shortly before the January 14 test, the goat died. A postmortem examination showed advanced generalized tuberculosis and further studies proved the bacillus to be of the bovine type.—*Tuberculosis in a Goat, C. P. Bishop, M. F. Barnes & J. B. Reidy, Jour. Amer. Vet. Med. Assn., October, 1934, lxxxv, 457.*—(*L. F. B.*)

Tuberculosis in Sheep.—Tuberculosis of sheep is exceedingly rare, there having been 17 cases reported by the Bureau of Animal Industry in about one hundred million sheep and lambs slaughtered between 1928 and 1933. In the period from 1904 to 1918 in the German abattoirs the percentage of cases varied from 0.14 and 0.22. A total of 7 cases of avian tuberculosis have been typed, and six are here reported, since the study was begun in 1922. Interesting features of 4 of the cases were that all were avian in type, all were generalized, and all showed an extreme degree of calcification. Infection is difficult to produce in sheep and is probably regressive in character except in rare individuals. Four transmission experiments were undertaken to determine if sheep could be infected with any degree of regularity. One group of animals was infected by intravenous injection of tuberculous material, another group was fed tuberculous material, a third group was placed in a cage barnyard with a flock of tuberculous chickens, and the fourth group was also exposed to a flock of tuberculous chickens. Although the tuberculin reaction became positive in all of the cases but one, from two to three months after infection, it began to fade in from 3 to 4 months and in a few cases became negative. A total of 18 sheep were exposed by the ingestion route and 3 were infected intravenously, yet only 6 animals carried the infection at the time of slaughter, as evidenced by chicken inoculation trials of lymph-node material. It is possible that there might have been more positive cases had they all been examined while strongly sensitized. Four lambs contained what appeared to be gross lesions, yet no infection was produced in chickens injected with material from them. This and the fading of the tuberculin reaction may be evidence that the sheep has a remarkable ability to overcome a tuberculous infection. It was impossible to confirm the assumption that the rare cases of tuberculosis in sheep might be due to mutations or variants of unusual virulence. Of the 3 intravenously infected sheep, 2 were positive. Two of the 3 sheep fed tuberculous material were positive. Of 15 sheep exposed to a flock of tuberculous chickens for approximately a year, 2 were positive.—*Avian*

Tuberculosis of Sheep, G. S. Harshfield & L. M. Roderick, Journ. Amer. Vet. Med. Assn., November, 1934, lxxxv, 597.—(L. F. B.)

Tuberculosis in Dogs.—That dogs may become victims of tuberculosis has been established for many years. Experimentally it has been shown that the dog is moderately susceptible to both bovine and human types but possesses a profound resistance to the avian type of tubercle bacillus. The incidence of tuberculous infection in various European countries is estimated at from 1.6 per cent to 5 per cent. It is reported as quite frequent in the Argentine. Figures for the United States are few but of 1,548 dogs examined postmortem at the University of Pennsylvania, tuberculosis was recognized in 1.0 per cent. Two cases are reported, the latter occurring in a laboratory animal that had lived under laboratory conditions for two and a half years. No definite source of infection could be traced. Clinical evidence seems to substantiate experimental observations that dogs are rather refractory to infection by way of the respiratory tract and that infection of the viscera occurs by way of the gastrointestinal tract. The majority of cases reported are of human origin which indicates that the possibility for this type of infection is greater than for the bovine type. Experimentally there is no evidence that dogs are more susceptible to the human type than to the bovine type. There are few symptoms that are characteristic and the tuberculin test is not dependable for diagnosis in dogs. The predilection of the infectious organism for the lungs and the character of the resultant lesions makes the tuberculous dog a distinct hazard to the health of man and particularly children.—*Spontaneous Tuberculous Infections in Dogs, W. H. Feldman, Jour. Amer. Vet. Med. Assn., November, 1934, lxxxv, 653.—(L. F. B.)*

Isolated Round Foci in Pulmonary Tuberculosis.—In recent years isolated round foci have repeatedly been described. As a rule, they can be recognized only roentgenologically. They are round or oval, perfectly homogeneous shadows, with well and sharply defined contours, approximately the size of coins. They occur with or without the presence of other tuberculous foci and are characterized by their long duration without apparent alterations. They may occur anywhere in the lung fields. Particularly when they are multiple, the differential diagnosis against tumor metastases is difficult and can, at times, be made only after prolonged observation. These foci *per se*, without the association with other foci of active tuberculosis, do apparently not produce clinical disease, and need no treatment. Anatomically they represent foci of caseation with firm hyaline capsules. A significant observation is the fact that they always show an intimate relation to bronchi. Frequently, a completely caseated bronchus is found in the focus. In some cases, disseminated foci are present in the vicinity, indicating the possibility of spread from the encapsulated foci. The relation of the bronchi to these foci is interpreted as suggesting the frequent, though not necessarily constant, bronchogenic pathogenesis of these lesions.—*Über Klinik und Pathologie der isolierten Rundherde der Lungen, W. Klein & K. Wolff, Beitr. Klin. Tuberk., July, 1934, lxxxv, 116.—(M. P.)*

Pathology of Simon's Foci.—Autopsies of adults with primary foci and Simon's foci show a very definite relation in the development of the character of either foci. Following the results of histological examination the focus of Simon represents a metastasis of the primary focus and shows in the capsule the structural type of both, the primary and the reinfection focus. The most common spread is haematogenously, the primary focus undergoing an exacerbation in the later stages following the primary infection; this interval is consistent with the seven to twelve year's period of anaphylaxis. Two cases suggest also the possibility of lymphogenous and continuous spread.—*Zur pathologischen Anatomie der Simonschen Herde, W. J. Pusik & A. I. Strukow, Ztschr. Tuberk., January, 1935, lxxii, 92.—(F. G. K.)*

Sepsis Tuberculosa Acutissima.—*Case Report:* A woman, 54 years old, died within five weeks with an acute febrile disease, which, in its clinical features, suggested typhoid fever. However, there was no enlarged spleen, no albuminuria, no roseola, and no serological reaction with typhoid or paratyphoid. The necropsy showed tuberculosis, apparently of intestinal origin, with massive caseation and liquefaction of the mesenteric lymph nodes and with numerous miliary necroses in lungs, spleen, liver, kidneys and bone-marrow, which contained many tubercle bacilli, but no specific granulation tissue. Human tubercle bacilli were isolated from the lesions. In quantitative experiments, they proved to be of particularly high virulence for guinea pigs. In comparing this case with more or less similar cases from the literature, the conclusion is reached that a particular condition of allergy must combine with a high bacillary virulence to produce, on haematogenous dissemination, this particular pathologicoanatomical picture.—*Sepsis tuberculosa acutissima, L.*

Jakobowicz, Beitr. Klin. Tuberk., September, 1934, lxxxv, 246.—(M. P.)

Pathology of Reinfection Foci.—Reinfection and other foci that may form following primary infections show a very definite relationship with each other. From the immunobiological point of view the reinfection is the result of a symbiotic immunity between the tubercle bacillus and the macroorganism. Chemically there is a definite difference between the reinfection and the primary infection which is consistent with an increase in water and a decrease in salts. There are 3 types of reinfection foci, namely, the classical (Abricossow-Rindfleisch), the type of single and multiple foci (Aschoff-Puhl), and a type of pleuropulmonary foci. The "Simon" focus has to be considered as an intermediary form between the primary and the reinfection foci. In 24 per cent of all the autopsies of adults with tuberculosis there was an endogenous development of reinfection from primary focus. The first and most frequent manifestation of exacerbation of reinfection foci is apparently represented by the "alterative" cavity. The first phase of a spread is usually lymphogenous, but in the further development the process is either lymphobronchogenic or lympho-haematogenic. The spread of tuberculosis in the pulmonary parenchyma depends largely upon constitutional factors and is a result of the histoarchitectural character of the tissue.—*Pathologische Anatomie der Reinfekte und ihre Bedeutung in der Phthisiogenese, W. H. Stefko, Ztschr. Tuberk., January, 1935, lxxii, 81.—(F. G. K.)*

Haematogenous Reinfection.—It is admitted that pathologicoanatomically it is impossible to prove definitely whether a given reinfection focus is produced by bronchogenic or haematogenous spread. However, a careful analysis of the pattern of all the foci permits coming to a conclusion on circumstantial evidence. On the basis of such considerations, it is calculated that the proportion of haematogenous to exogenous processes to the lung is as 1/3 to 2/3.—*Welche Wahrscheinlichkeitsbeweise lassen sich pathologisch-anatomisch für die Annahme einer hämatogenen Reinfektionsphthise erbringen? K. Rosenkranz, Beitr. Klin. Tuberk., December, 1934, lxxxv, 584.—(M. P.)*

Experimental Reinfection in Tuberculosis.—The primary infection, produced in guinea pigs by inoculation with human bacilli, does not protect against reinfection. Many of the animals showed complete recovery. It is possible that tubercle bacilli remain within the organism in a saprophytic state without liberating toxins. A second infection, produced by the injection of bovine bacilli while the first infection is still active, causes a diffusion of the bacilli throughout the body. The offspring of guinea pigs made tuberculous by inoculation, show some degree of resistance to tuberculosis. In these experiments the inoculations were made by hypodermic injections.—*Reinfezioni tubercolari sperimentali, Ilvento, Maggiora-Vergano & Vivaldi, La lotta contro la Tubercolosi, November, 1933, iv, 1173.—(U. E. Z.)*

Dispersion of Tubercle Bacilli in Human Body.—Fragments of tissues and organs were removed with aseptic precautions at autopsy from cases of pulmonary tuberculosis. Each piece was examined histologically and culturally, and then inoculated into 2 guinea pigs for the purpose of determining the presence of tubercle bacilli, carried by the blood-stream and deposited in immune tissue. Out of 40 cases cultured and inoculated there were 10 positive results. The histological examination had been negative in all the cases. Of these 10 positive results, six belonged to cases in which bacillary dissemination was evident. If these observations were subtracted there remained actually only 4 positive results. *Conclusions: 1:* These examinations do not favor the theory of the existence of terminal bacillaemia in pulmonary tuberculosis. *2:* In adults the different tissues and organs do not generally contain tubercle bacilli, or they contain so few that they can be recovered only by cultures or animal inoculation. The general conviction is that tubercle bacilli do not invade the blood-stream during life and that tubercle bacillaemia is exceptional, and, in all probability, if it does occur it is transient and of low intensity.—*La dispersion du bacille de Koch, jugée par l'etude bactériologique et histologique des organes et tissue prélevés post mortem. Résultats obtenus chez les tuberculeux pulmonaires adults, R. Debré & M. Perrault, Compt. Rend. Soc. Biol., January 5, 1935, cxvii, 28.—(M. T. W.)*

"Good Chronic" Case of Tuberculosis.—The criteria for a "good chronic" case of tuberculosis are as follows: A cavity at least 2 cm. and usually larger in diameter must be present. The general condition must be favorable. The temperature and pulse must be normal during the period of observation of several months. The appetite and strength must be good and the patient must sleep well and be able to take some exercise. Expectoration may be present but must not be excessive. The number of

tubercle bacilli in the sputum is not taken into consideration. Patients not conforming to these criteria are classified as "bad chronics," but the latter group is a broad one embracing many patients slipping from the better to the worse group. In order to determine what happens to the "good chronic" case the authors studied 336 patients at the Trudeau Sanatorium and forty-seven patients treated in the village of Saranac Lake. The condition of the patients was noted at the end of five and when possible at the end of ten years. Few of these patients received any form of surgical treatment and if so they did worse than those who received none. At the end of five years 80 per cent of the "good chronics" were alive and only 38 per cent of the "bad chronics." Of the "good chronics" 54 per cent were at work and of the "bad chronics" only 12 per cent. At the end of ten years the figures are, for the "good chronics," 64 per cent alive and 52 per cent at work; for the "bad chronics," 25 per cent and 11 per cent, respectively. The "good chronics" do remarkably well and their conditions show little change in the number working at the end of ten when compared with those at the end of five years. During the first three years 14 per cent of the "good chronics" and 50 per cent of the "bad chronics" die, while at the end of five years the figures are respectively 19 per cent and 63 per cent, and at the end of ten years 32 per cent and 75 per cent.—*The Fate of the "Good Chronic" Case of Tuberculosis: a Yardstick for the Results of Thoracoplasty, L. Brown & H. L. Sampson, Jour. Am. Med. Ass., September 22, 1934, ciii, 913.*—(*G. L. L.*)

Atelectasis in Pulmonary Tuberculosis.—The occurrence of atelectasis in the course of pulmonary tuberculosis has received increased attention during the last few years. Pathologicoanatomically, two types of atelectasis are recognized: compression atelectasis and resorption atelectasis. In the latter there is frequently an occurrence of oedema. This condition has been described as "drowned lung." Since atelectasis may occur with or without oedematous transudation, it becomes necessary to differentiate atelectatic collapse and atelectatic infiltration. From roentgenological observations, certain characteristic developments can be deduced. Following haemoptysis more or less extensive atelectasis may develop, due to bronchial occlusion by blood-clots. In chronic tuberculosis atelectasis is not rare and is frequently wrongly diagnosed as cirrhosis of the lung. When pneumothorax is administered in such cases the operator is surprised to find easily a free intrapleural space and complete collapse of the lung. Such extensive atelectases may be caused either by the occlusion of a lobar bronchus, by enlarged lymph nodes, or by tuberculosis of the bronchial wall. Or, it may be caused by multiple stenoses in small bronchi. In the course of pneumothorax treatment, a whole lung or single lobe may become atelectatic, indicated by a diffuse increased density of the affected part. Whenever a collapsed lung appears denser than the degree of collapse would lead one to expect, atelectasis should be suspected. Attention is drawn to the frequent occurrence of circumscribed atelectasis in pulmonary tuberculosis. Extensive cirrhotic processes, particularly in the upper lobes, must frequently be interpreted as caused by resorption atelectasis on the basis of bronchial obstruction by tuberculous scars. Since atelectasis may enhance cirrhotic processes, it frequently contributes to the healing of tuberculous lesions.—*Atelektase und Lungentuberkulose, F. Fleischner, Beitr. Klin. Tuberk., October, 1934, lxxxv, 313.*—(*M. P.*)

Resolution of Experimental Tuberculous Pneumonia and Its Relation to Epituberculosis.—What is the explanation of pulmonary consolidation occurring in known tuberculous individuals (epituberculosis)? Experimental studies done on this question are interesting. Previous experimental work has made plain the fact that hypersensitiveness established by infection with tubercle bacilli is one of the prerequisites to the formation of tuberculous pneumonia. Experimental tuberculous pneumonia was studied especially from the standpoint of specificity and capacity to resolve. Normal healthy adult rabbits were used. Some of these were sensitized by inoculation subcutaneously with human tubercle bacilli. One month later these animals together with normals had instilled intratracheally (by needle) either a suspension of human tubercle bacilli or tuberculin in varying dosage. Frequent roentgen examinations and, at varying intervals, histological examinations were made. Almost every animal in the allergic group showed roentgen ray shadows of greater or less degree. One-half of the animals receiving large doses of tubercle bacilli died during the first two weeks following inoculation and thus serial roentgenograms revealed no resolution. Serial roentgenograms of the survivors and every one which received a small dose of tubercle bacilli revealed obvious signs of resolution. Forty-eight hours after inoculation a large, moderately dense shadow appeared in the dependent lung. At ten days the shadow indicated considerable ab-

sorption while in forty days the shadows had almost entirely disappeared. This compares, except for time relationship, with the ordinary case of epituberculosis seen clinically. Gross and microscopical examination of animals killed at varying stages of the consolidation showed progression in a few with large doses and regression or resolution in the others. Grossly the lungs in the nonlethal animals showed massive involvement of a lobe, or even lung, becoming progressively less until the lung was of normal appearance. Microscopically the early lesion was that of extensive, exudative tuberculosis with many large mononuclear or epithelioid cells filling or half filling the alveoli, and also small islands of caseation; the later lesion involved simply an area of smaller size but comprised the same type of cells; the end-result was often an entirely normal histological structure in an area known from the roentgenogram to have been consolidated earlier in the experiment. The cells appeared to grow fewer rather than to undergo autolysis; no cellular debris or fragments were detectable. Might these reactions have been due to extraneous bacteria introduced by the operative procedure? Extensive search failed to reveal any microörganisms except tubercle bacilli which were demonstrated in section after section from the consolidations. This led to the assumption of specificity of the reaction. The allergic animals receiving the tuberculin (Old Tuberculin or T. P. T.) showed a transient but definite consolidation with every histological characteristic of tuberculous pneumonia. This reaction appeared as a dense shadow in the film. However, normal animals used as controls in this group had only a slight transient cellulitis which cast no shadow in the roentgenogram. It is concluded that the resemblance between experimental tuberculous pneumonia and *Epituberculosis* is so striking as to suggest that the latter affection is simply tuberculous pneumonia.*—*The Specificity of Pulmonary Consolidation in Tuberculous Patients (Epituberculosis)—Resolution of Experimental Tuberculous Pneumonia, H. S. Willis, Am. J. Roentgenol. & Rad. Ther., June, 1934, xxxi, 721.*—(*E. M. J.*)

* The relatively mild symptomatology of epituberculosis, its characteristic location, as well as authenticated cases in which was found a broncho-stenosis caused by enlarged mediastinal lymph nodes, can also suggest massive atelectasis as a probable cause of "epituberculosis," and this particularly because of the relatively mild constitutional features related to "epituberculosis."—(*A. K. K.*)

Physiological Effect of Oxygen.—Healthy male individuals breathed in an atmosphere of 96 to 99 per cent of oxygen at pressures varying from 1 to 4 atmospheres. No alarming symptoms occurred within 4 hours at 1 atmosphere pressure, within 3 hours at 2 atmospheres, and within 2 hours at 3 atmospheres. The symptoms which occur under these conditions are chiefly referable to the nervous system. At 4 atmospheres' pressure convulsions were observed in 1 subject and syncope in another after exposures of approximately 45 minutes. At lower pressures, neuromuscular coördination was impaired and the power of attention decreased. Only in one subject was there any evidence of an irritating effect of oxygen on the lungs. The oxygen consumption is high during the first 20 minutes; it then decreases and remains at a constant level for periods up to 4 hours at atmospheric pressure. In all these experiments the blood-pressure, the respiratory rate and the minute volume (with two exceptions) were constant.—*The Effect of Oxygen on Man at Pressures from 1 to 4 Atmospheres, A. R. Behnke, F. S. Johnson, J. R. Poppen & E. P. Motley, Am. J. Physiol., January, 1935, cx, 565.*—(*M. P.*)

Effect of Increased Air-Pressure.—The effect of increased air pressure on vital capacity, expiratory force and breath holding ability was studied in 25 subjects who were experienced divers and accustomed to the exposure to increased pressure. The vital capacity increased 1.6 to 22.6 per cent (with one exception, in which there was an insignificant decrease). Expiratory force increased from 0 to 50.6 per cent (with two exceptions, which showed 5.0 and 8.0 per cent decrease respectively). The apnoeic period increased in all subjects from 31.4 to 267.2 per cent.—*The Effect of Increased Air Pressure on Vital Capacity, Expiratory Force and Breath-Holding Ability, C. S. Shilling, R. A. Hansen & J. A. Hawkins, Am. J. Physiol., January, 1935, cx, 616.*—(*M. P.*)

Alveolar Air in High Altitudes.—During the Mt. Everest expedition in 1933, samples of alveolar air of human beings were obtained and analyzed. At an altitude of about 23,000 feet, at a barometric pressure of 339 mm. of mercury, the carbon-dioxide concentration of the alveolar air was about 6.62 per cent and that of the oxygen about 13.3 per cent from which a respiratory quotient of 0.83 is calculated. This person had been acclimatized for some time to high altitudes.—*Observations on the Composition of Alveolar Air on Everest, 1933, R. Greene, J. Physiol., November, 1934, lxxxii, 481.*—(*M. P.*)

Nervous Control of Intercostal Muscles.—The experiments were performed on cats that were decerebrated or under nembutal anaesthesia. Nerve fibers supplying intercostal muscles were separated and their impulses were recorded during the act of respiration. Each contraction is the result of a short burst of impulses. Variations in the depth of costal respiration are the result of variations in the frequency of impulses from the individual nerve cells, the duration of these impulses and the number of nerve cells in action. The nervous impulses in the fibres leading to the external intercostal muscles are generally associated with inspiration: those, with the fibres to the internal intercostal muscles, with expiration; but the interchondral part of the internal intercostal muscles contracts synchronously with inspiration. The impulse frequencies increase with increasing asphyxia. With the onset of respiratory failure, the frequency of impulses increases very much. The discharge finally fails as the result of more and more impulses dropping out of the regular rhythm which thus becomes a series of scattered volleys.—*The Nervous Control of Intercostal Respiration, D. W. Bronk & L. K. Ferguson, Am. J. Physiol., January, 1935, cx, 700.*—(*M. P.*)

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